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Use of hip silhouettes for skirt pattern alterations

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USE OF HIP SILHOUETTES FOR SKIRT PATTERN ALTERATIONS

by

Sister Mary Patrice Reed, O.S.B.

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirements for the Degree of
MASTER OF SCIENCE

Major Subject: Textiles and Clothing

Approved:

Signatures have been redacted for privacy

Iowa State University
Of Science and Technology
Ames, Iowa

1963

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INTRODUCTION

In a study of the relationships of hip silhouettes to the corresponding body measurements Sister Liguori Philipsz (20) found that her subjects differed enough in the shape of the hip curve of the body to make it possible to classify them into three different groups. Her findings emphasized the fact that even though several persons are the same size they may be very different in shape. One question which arose was: "Would fitting problems be simplified if the hip silhouette could be 'transplanted' to the proper location in the side seam of the skirt pattern?"

Present pattern alteration methods make little reference to the curved shape of the hips. Most skirt alteration methods advocate that the pattern be slashed either lengthwise or crosswise and spread apart the amount needed to increase the size or that the pattern be folded into a lengthwise or crosswise pleat to decrease the size. Evans (9, pp. 261-265), Ryan (23, p. 405), Early et al. (5, pp. 1-3, 30-41) and Green (11, pp. 140-143) employ this method. Erwin (8, p. 16) and Unit Method of Sewing (15, pp. 44-45) frequently add a slash perpendicular to the first slash. The purpose of this slash is to control width in the lower part of the skirt rather than to change the curve around the hip. One of the principles stressed in this slash-and-spread method was that of maintaining the original pattern outline. Picken (22, p. 56), Ryan

(23, pp. 405-410) and Hillhouse (13, p. 125) subscribe to this principle. An opposite view is taken by Bane (2, p. 59) and Siemen (24, p. 14) who suggest that alterations can be made at seam lines.

Reference to fitting the body curves is made by Hall (12, p. 240) who writes:

The conventional method of fitting the figure by splitting and spreading the pattern will be used only to lengthen certain sections but cannot be employed for fitting the curves of the figure or for fitting posture. This method of pattern alteration may accomplish the purpose of 'not altering the lines of the pattern' but it does not produce the result desired: 'fitting the figure'

Mansfield (17, p. 59) gave seamline alterations as her first preference stating that "The most obvious method of fitting a pattern to the body is to slope or curve seam lines along body curves."

Neither of these authors, however, gave specific directions for fitting the hip curve.

A pattern alteration method which would 'transplant' the hip silhouette onto the side seam of the pattern would take into account individual differences. The major purpose of this study was to explore the possibility of developing such a method.

The basic skirt (also referred to as a straight or fitted skirt) presents a more difficult fitting problem than do skirts of other styles. This skirt has the least fullness or

width at the hipline and therefore has a more pronounced side seam curve. When this curve does not fit the individual the problem is often traceable to two sources: first, failure to establish the correct distance along the hip curve and second, the need for more width at the hipbone level three inches below the waist. The use of a hip silhouette alteration method might make it easy to correct these two problems. The basic skirt was chosen, therefore, as the medium for the development of a hip silhouette method of pattern alteration.

METHOD OF PROCEDURE

In order to explore the practicability of such a method, the general procedure used in this study was that of altering a commercial basic pattern, making it up into a muslin skirt and fitting it on the subject. On the basis of the results obtained, a method was established. The problem was exploratory in nature, therefore each specific procedure tested and the sequence of factors tested was dependent on the results of the previous test.

Commercial Pattern Measurement Study and
Choice of Pattern to be Altered

A preliminary study of commercial basic patterns was made. Measurements were taken of the Misses size 12 ^{body} skirt pattern for each of these basics. Data obtained from these measurements were used in the development of the Hip Silhouette Alteration Method. The following commercial basic skirt patterns were measured:

Simplicity 4252
(a proportioned pattern in medium height) (26)

Advance 8350 (1)

Butterick 200 (4)

McCall's Try-on B 100 (18)

Simplicity Basic (25)

Vogue 3000 (32)

Elsé (6)

The Elsé basic pattern was eliminated because the body measurements given on the pattern envelope did not correspond to those found on the other six pattern envelopes and this made it difficult to use it for any comparisons.

The measurements taken from these six patterns were organized in tabular form so that comparisons could be made more easily (Appendix A). Often minimal differences of 1/16 of an inch were disregarded.

A measurement study was made also of all Vogue patterns in Misses sizes 10 to 20 to determine the increment in size. A table of these measurements was prepared (Appendix B).

The Vogue basic pattern 3000¹ was used in this research. Factors other than the results of the pattern comparison study influenced this choice. The Vogue pattern was available locally and it was the pattern used by the pattern making and clothing construction classes at Iowa State University.

Measurements

Measurements of the subjects were taken to obtain those needed for alteration of the skirt patterns. The measurements taken were:

A. Lengthwise measurements

¹Henceforth reference to the Vogue pattern will be made without the use of the number since it was the only Vogue pattern used in the study.

1. Waist-to-hips
2. Waist-to-floor
3. Hem-to-floor

B. Circumference measurements

1. Hips
2. Waist

Measuring devices and preparation
of the subject

A pliable tape measure was tied in place on the subject to establish the position of the natural waistline. This tape was considered as a replacement of the skirt waistband. Other materials which have been used for this purpose are: elastic, suggested by Early *et al.* (5, p. 6) and string or chain, suggested by Strickland (29, p. 14).

A second tape measure, a plastic one, was used for the circumference measurements and for the waist-to-hip length measurement. Another plastic tape measure, used for the waist-to-floor measurements, was stabilized at the lower end by attaching it to a yardstick for about three-fourths of the length of the yardstick (Fig. 1). The unattached end could be fitted smoothly along the waist-to-hip curve of the body.

Because the study was concerned with the fit of basic skirts and because these skirts are usually worn with a girdle, the subjects were measured over their slips while wearing a girdle. This procedure was recommended by

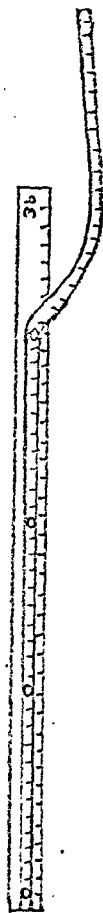


Fig. 1. Extended yardstick

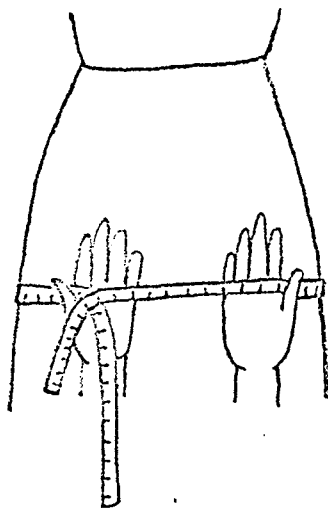


Fig. 3. Allowance for ease

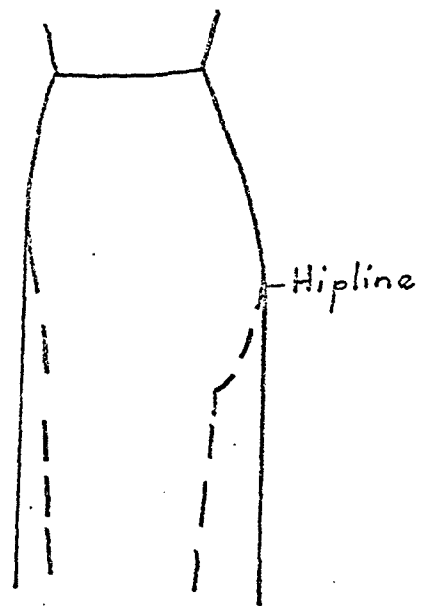


Fig. 2. Location of hipline

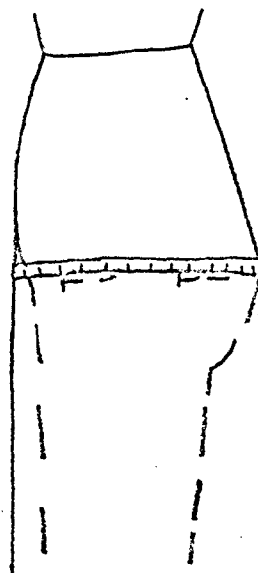


Fig. 4. Allowance for ease

Strickland (29, p. 14), Early et al. (5, p. 6), Hall (12, p. 242) and Green (11, p. 117). The subjects wore their usual street shoes.

Establishment of hipline and
lengthwise measurements

Mme. Sykora's technique for the determination of the hipline as given by Philipsz (20, p. 3) was chosen for this study. The subject's figure was viewed from the side and the hipline position was established on the back-body-contour. A pin was placed horizontally in the subject's slip at the place where the figure ceased to curve outward and began to curve inward (Fig. 2). The distance from this pin up to the lower edge of the waistline tape was called the hipline length. Later, the dart length in the back was related to the hipline length and the hip circumference was measured at the hipline.

The Sykora method, unlike other methods of establishing the hipline, is based upon individual differences. Some authors designated a specific number of inches from the waistline to the hipline. Erwin (7, p. 200), Broderick (3, p. 2), Hall (12, p. 245) and Early et al. (5, p. 7) gave seven inches for this distance. Tanous (30, p. 14) gave a range of seven to nine inches and Picken (21, p. 18) gave a range of six to ten inches. Fales (10, p. 169) used two hiplines, one at the fullest part of the hips at about the six inch level and one at the fullest part of the thigh at about ten inches.

The Unit Method of Sewing (15, p. 30) distinguished between the hipline and the thighline. The hipline was seven inches below the waistline and the thighline was at the fullest part.

Some authors located the hipline at the widest part of the body below the waistline. Different methods were used. Green (11, p. 122) located the hipline at the hollow which appeared at the hip joint when the subject stood with feet apart and pigeon-toed. Strickland (29, p. 15) used a plumb line at the side of the body to find the widest point. According to Smith (27-28, p. 5) the widest part of the body below the waistline was determined by both a front view and a side view and if this were not conclusive two measurements, one at the hip level and one at the thigh level, were taken and the larger one was considered to be the hipline.

The waist-to-floor measurements were taken using the stabilized tape measure described earlier. These measurements were taken at center back, right side, center front, and left side, again measuring up to the lower edge of the waistline tape.

The hem-to-floor measurement was taken when the subject was wearing her dress so that the skirt hem could be used to help determine the skirt length.

Circumference measurements

A row of pins in line with the first pin that established the hip length was placed around the subject's figure. The hipline circumference was measured with the lower edge of the tape measure resting on this row of pins. A reading of the measurement was taken while the tape was snug. Snug measurements are those taken without any slack, but also without indenting the figure. To establish the amount of hipline ease to be used, the tape was let out two inches. Then the hands were inserted behind the released tape, and the tape was held out in line with the "abdominal extension" (31, p. 2) (Fig. 3 and 4) and the adequacy of the two inches was evaluated. Although two inches was usually needed, one and one-half inches of ease was sufficient if a tighter fitting skirt was desired. Hall (12, p. 245) describes a similar procedure for estimation of the ease in the following statement: "Do not draw the tape tight in the center front - no tighter than a line dropped straight down from the abdomen."

The exact waistline measurement was taken with the plastic tape held snugly around the waist. A set amount of waistline ease (one and one-half inches) was added to the waist measure for all subjects. This was the amount of ease used by Sister Liguori Philipsz (20, p. 6). The handling of this ease is discussed in a later section of this chapter.

Measurement records

All of the measurements were recorded on a data chart for each individual (Appendix C). This chart was later revised and included in the pattern alteration directions (see Findings). There were three kinds of measurements included in the revised record. They were:

1. Measurements taken on the subject
2. Measurements derived from those taken on the subject
3. Measurements selected from a reference table (see Findings)
 - a. Length of hipline (Section A of table)
 - b. Length of waistline (Section B of table)
 - c. Dart width (Section C of table)

The reference table, mentioned above, was developed to reduce the number of computations for those who may wish to use the alteration method. The danger of error and the amount of time involved were reduced also.

Hip Silhouettes

Instruments

Sister Liguori Philipsz (20, p. 6) had used a large beam-caliper for drawing the hip silhouettes. Uncalibrated outside-calipers were developed at the Instrument Shop of Iowa State University under the direction of Andy Wunderlich.

Three instruments were made before a satisfactory one was obtained.

The first instrument was made from an aluminum fabric square. An aluminum sliding arm was attached and pencil holders placed at an angle at the end of both the stable and the sliding arm. The sliding arm did not move as freely as was necessary and it was not firm on its axis. The silhouette drawings made by this instrument had jagged outlines.

On the second instrument the sliding arm moved along by means of a sliding tube within a tube. The sliding arm still did not slide freely enough to give a smooth outline of the silhouette.

The use of ball bearings in the third and final instrument produced the freedom of movement needed in the sliding arm. A collar around the base of the sliding arm and the use of a second supporting rod made it firm on its axis and it gave a smooth outline of the silhouette. This was the instrument used to make the silhouettes for this study.

Since outside calipers are not available to home sewers, a very simple instrument was improvised by taping a soft lead pencil at the corner along the edge of the long arm of a wooden fabric square. When silhouettes made with this instrument were superimposed on the silhouettes made with the calipers, they compared favorably.

Method

The silhouette was traced on a large sheet of white paper. The paper was attached to a flat vertical surface so the upper edge was somewhat above the waistline of the subject. The subject (in her slip and while wearing the same girdle as was worn for taking measurements) stood with her back against the paper. The caliper was held firmly in a horizontal position at a point slightly above the waistline. The silhouette was drawn by slowly moving the caliper down around the hips. The silhouette was made long enough to extend below the widest part of the subject's figure.

Two or more silhouettes were made for each subject in order to check one silhouette against another for accuracy and similarity. Also, a silhouette was drawn with the improvised fabric square. The smoothest silhouette made with the caliper was selected for use. Slight irregularities in the silhouette which were a result of the drawing or which were due to the subject's clothing were smoothed out. A colored pencil was used so that the original silhouette lines were still maintained, although this 'perfecting' did not essentially alter the silhouette. The silhouette line was traced on tagboard for the purpose of making a silhouette pattern.

Selection of Subjects

Measurements were taken of thirteen women who were students, staff members, and employees of Iowa State University. The majority were from the Textiles and Clothing Department. The four subjects who took part in this study were selected from this group of thirteen women and were designated as subject A, subject H, subject W and subject L. These four subjects exhibited a range in differences between the waistline and hipline measurements. These differences and that of the Vogue basic pattern are presented in Table 1.

Table 1. Hipline-waistline circumference difference for the four subjects

Subject	Difference in inches
L	8 1/4
A	9 7/8
Vogue basic	9-10 (range)
H	12
W	15 3/4

The relationship of this difference to the curve of the silhouette is illustrated by the silhouette drawings (Fig. 5). The silhouettes were classified according to the types set up by Sister Liguori Philipsz (20, p. 14).

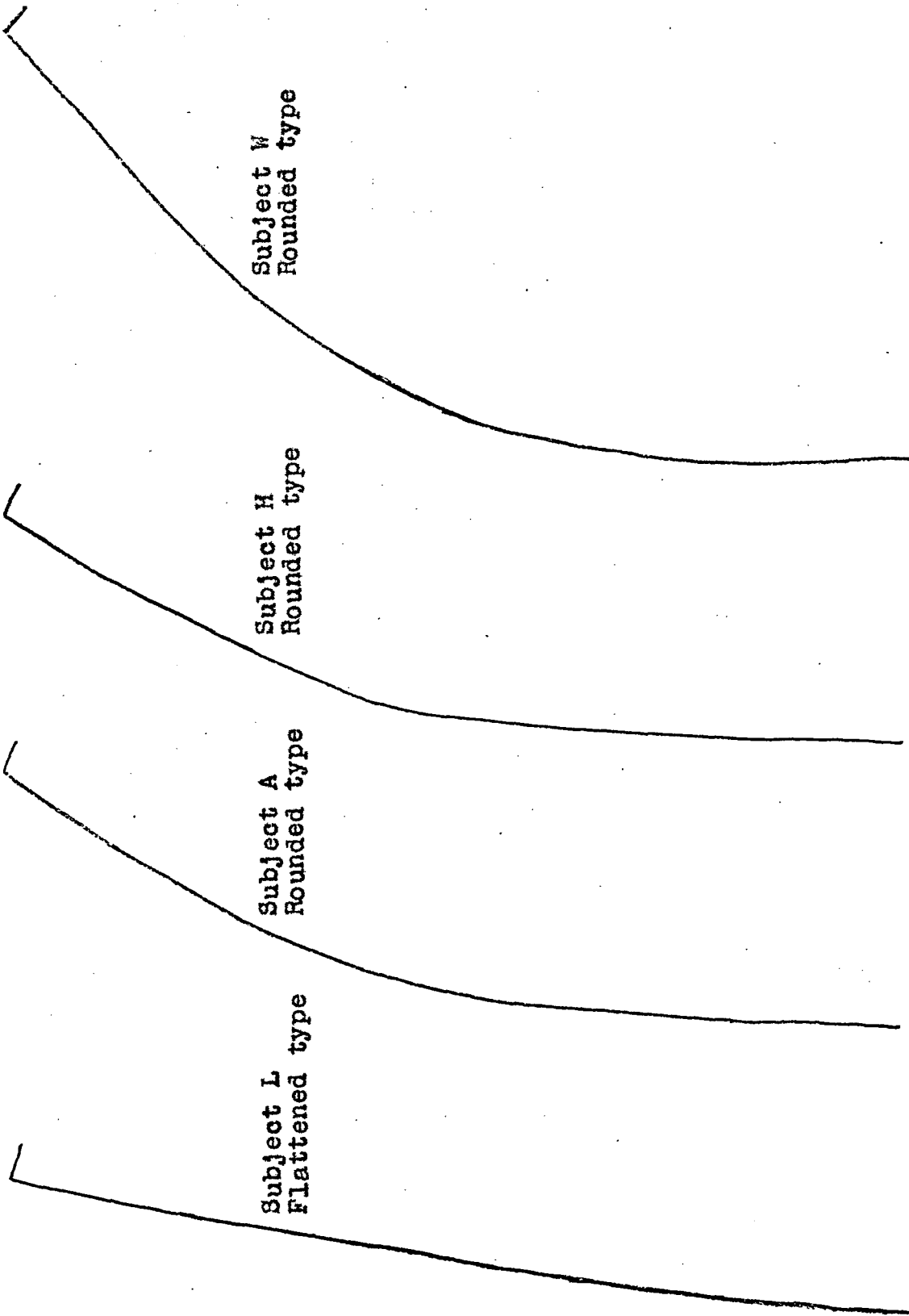


Fig. 5. Hip silhouettes of four subjects

Muslin Shells of Basic Skirts

Muslin shells of the Vogue basic skirt pattern were made for all Misses' sizes from 12 to 20. They were made with narrow muslin waistbands. Zippers were set into the center back seam of the skirts so the side seam would fit smoothly over the hip curve. No hem was allowed.

The subjects tried on the shells to determine the size of pattern which fit the best. The size that fit best was recorded on the data chart (Appendix C).

This size pattern was used in the testing done on that subject.

Development of Alteration Method Using Hip Silhouette

Experimental work consisted of an exploration of the use of certain factors in order to develop an alteration method and directions for its use.

Generally, this testing was done by making patterns incorporating the factor under study. For some, no pattern was necessary. Factors were adopted or discarded on the basis of satisfactory or unsatisfactory performance. For most of the study, the patterns were paper copies of the altered Vogue pattern but later as the directions were developed the Vogue pattern itself was altered because it simplified the procedure and consequently the directions. Sometimes the results in the paper pattern were sufficient basis for accepting, rejecting,

or changing the technique. More often, though, a muslin shell was made from the pattern and tried on the subject before a decision was made.

In the construction of these shells, the waistline was finished with seam tape instead of a muslin waistband. Zippers were put in the center back seam and no hems were allowed. One and one-half inches of waistline ease were allowed. Of this, one inch was eased-in at the waistline and one-half inch remained in the total waistline measurement to allow for fabric thickness and comfort.

Test factors

Several minor test factors were evaluated. Their usefulness was established with a minimum amount of testing and they were then used throughout the remainder of the study. The factors were:

1. Dart length
2. Amount of flare added
3. Pivot point for pivot method
4. Choice of right or left hip silhouette
5. Amount of waistline ease
6. Amount of hipline ease

Dart length Dart length is related to dart width (Latzke, 16, p. 113) and to the distance from the origin in a seamline to the roundest part of the area to be fitted

(Hollen, 14, p. 5). The back dart length was fixed at one and one-half inches above the hipline. The front dart length was set at three inches in a few of the initial tests but a three and one-half inch length was established and used for all later tests.

Amount of flare added As soon as tests indicated that some flare should be used in the basic skirt, one inch of flare was added to the back pattern by the pivot method.¹ The flare in the skirt front was the automatic result of pivoting the pattern to reduce the size of the unaltered dart in the skirt front pattern to a width of three-fourths inch at the waistline. The front dart was not altered for individual differences until later when the testing done on subject W indicated a need for this. According to Hollen (14, p. 103), one to three inches of flare does not change the straight line effect of the silhouette of the basic skirt.

Pivot point for pivot method Two pivot points for the pivot method of adding flare were tested. The first position to be used was halfway between the tip of the back dart and the original hipline of the Vogue pattern. The second position was halfway between the tip of the back dart and the hipline after alteration for the subject. The resulting

¹When the pivot method of adding flare is referred to in this thesis, either the pattern was slashed to the pivot point and the pattern was pivoted or the entire pattern was pivoted without being slashed. (14, pp. 9-14)

differences in the amount of flare and in the reduction of dart width were not sufficient to favor either position. The second position was chosen because it used the hipline which was adjusted for the individual differences.

Choice of right or left hip silhouette Both the right and the left hip silhouettes were used on the first two patterns made for subjects A and H. The right hip silhouette of subject H had a more pronounced curve than the left silhouette with the result that the right side seam of the muslin skirt had a 'pouched'¹ effect. To counteract this, the left hip silhouette was used for both sides of the skirt and the waistline was raised to compensate for the longer seam length of the original right side hip silhouette. The result was an improvement in fit and so this procedure was used from here on.

Amount of waistline ease The waistline ease was set at one and one-half inches. The Sykora method² recommended the amount of ease that could be obtained by inserting two fingers under the measuring tape but this amount did not seem to be adequate. Accordingly a snug waist measure was taken of the subject and then one and one-half inches of ease were added.

¹In this thesis the term 'pouch' denotes a bulge in the side seam at the hipbone level of the skirt.

²Norma Hollen. Iowa State University, Ames, Iowa. Mme. Sykora's drafting method. Private communication. 1962-1963.

Amount of hipline ease Hipline ease of two inches was used in all skirts except those made for subject H. One and one-half inches was enough for hipline ease in her pattern. Two inches of ease seemed to be a generally accepted amount. Hillhouse (13, p. 67), Unit Method of Sewing (15, p. 31) and Evans (9, p. 261) recommend two inches of ease. A range of two to three inches was given by Siemen (24, p. 10), Latzke (16, p. 90) and Bane (2, p. 48).

The test factors which were of major importance in the development of the alteration method were:

1. Hip silhouette 'transplant' I, II, and III.
2. Back dart width:
 - a. Pepin (19, p. 171) or Latzke (16, p. 123) method
 - b. Sykora method¹
 - c. Proportion formula²
3. Front dart width - proportion formula
4. Method of adding flare:
 - a. Drawn on at side
 - b. Added by the pivot method
5. Reshaping of the 'transplant' for extremes from normal curve

¹Ibid.

²Norma Hollen. Iowa State University, Ames, Iowa. Proportion formula for determination of dart width. Private communication. 1962-1963.

6. Length adjustment for front, back and side seam differences

7. Waist length differences:

a. 1 inch longer front

b. 2 inch longer front

Hip silhouette 'transplant' I, II, and III Hip sil-

houette 'transplant' I was made in the patterns used for the initial tests made with subjects A and H. In this 'transplant' the hip silhouette was joined from the hipline, which included the ease, to the waistline which also included the ease. In Fig. 6, A to A' is the waistline ease and B to B' is the hipline ease. The 'transplant' is shown as a broken line. The results of this alteration were unsatisfactory since a 'pouch' was formed in the side seam at the hipbone level. In an attempt to eliminate this 'pouch', hip silhouette 'transplant' II was introduced. In this 'transplant' the hip silhouette was joined from the hipline which included the ease, to the waistline which included no ease. Waistline ease was added after the 'transplant' was made. A dip occurred in the side seam where the hip curve met the flare line (Fig. 7).

Hip silhouette 'transplant' III was used successfully to eliminate this dip. This time the hip silhouette was joined from the hipline which included no ease, to the waistline which included no ease; the ease in both places was added after the 'transplant' (Fig. 8).

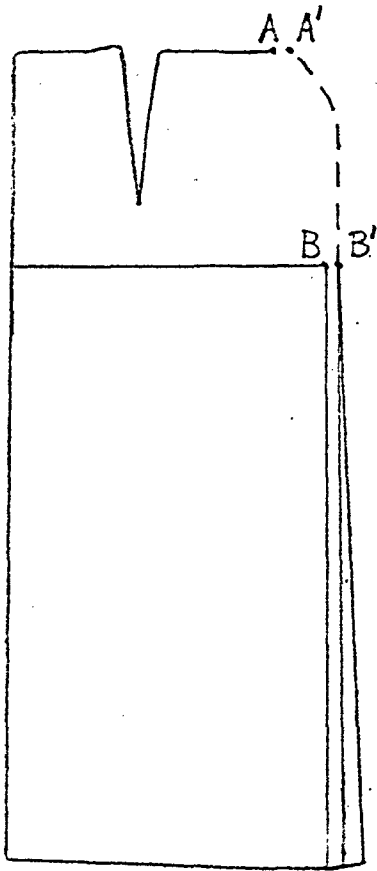


Fig. 6. 'Transplant' I

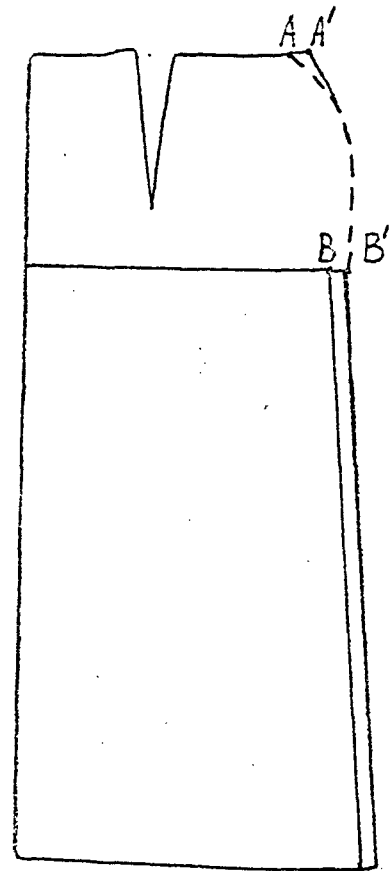


Fig. 7. 'Transplant' II

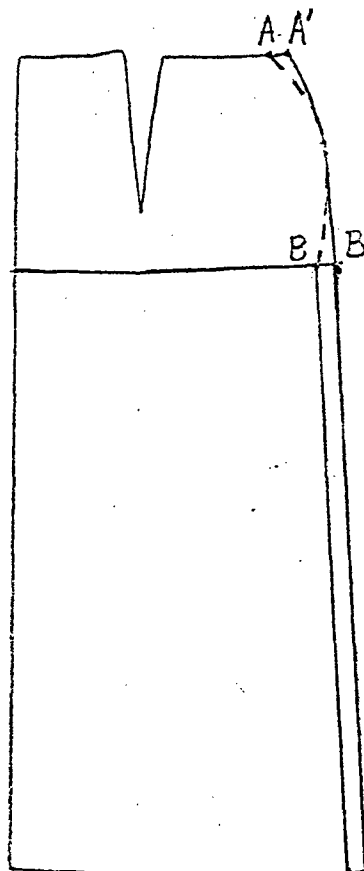


Fig. 8. 'Transplant' III

Back dart width The first method for the determination of the back dart width, found in Pepin (19, p. 171) or Latzke (16, p. 123) is based upon the difference between the waist and hip measurement of the pattern piece. Two-thirds of this difference is converted to dart and one-third determines the slant of the hip curve at the side seam.

The second method was obtained from the drafting techniques of Mme. Sykora.¹ After establishing the hipline width and hemline width (hipline width + some flare), a diagonal line was drawn through these two points continuing on beyond the waistline level. The distance from this line over to the waistline was divided into three parts. Two parts became the dart width and the third part determined the slant of the hip curve at the side seam.

The third method for the determination of dart width, the proportion formula, was based upon the direct relationship of the difference between the waistline and the hipline circumference measurements to the width of the dart. Evans (9, p. 281) discussed this relationship. The formula is as follows:

Average difference between hips and waist of Vogue's back skirt pattern	: Vogue's back dart width	:: Difference between hips and waist for subject's altered back skirt pattern	: Back dart width for subject
3 1/8"	: 1 7/16"	::	b : x

¹Norma Hollen. Iowa State University, Ames, Iowa. Mme. Sykora's drafting method. Private communication. 1962-1963.

The first two parts of the formula were established as constants as a result of the study of the Vogue pattern measurements (Appendix B). To obtain the first number of the formula, three and one-eighth inches, an average of the difference between the hipline and waistline of the Vogue back skirt pattern was computed. The back dart width was constant for all Vogue pattern sizes and no average was necessary. The difference between hipline and waistline of the subject's altered back skirt pattern was derived from the hipline plus ease and the waistline plus ease. The front waistline was two inches longer than the back waist line. The front hipline was one inch longer than the back hipline. The study of the Vogue pattern (Appendix B) shows this difference to be the same as that of the Vogue pattern. Later a table (see Findings) was made which gave the back dart size for a range of differences between the waistline with ease and the hipline with ease.

The proportion formula can be simplified mathematically as follows:

$$3 \frac{1}{8}'' : 1 \frac{7}{16}'' :: b : x$$

$$3 \frac{1}{8}'' x = (b) 1 \frac{7}{16}''$$

$$x = \frac{1 \frac{7}{16}''}{3 \frac{1}{8}''} b$$

$$x = \frac{23}{16} \cdot \frac{8}{25} b$$

$$x = \frac{23}{50} b$$

$$x = .46 b$$

To test these three methods of determining dart width,

three skirt back paper patterns were made for subject A, each pattern employing one of the methods. One pattern which was made by the Pepin and Latzke method was eliminated without being tested in muslin because the dart was very wide, two and one-eighth inches, as compared to the other two patterns. The other two patterns were tested in muslin for subject A. Also, these two methods were evaluated in muslin skirts made for subject H. None of the skirts showed sufficient difference between the two methods to make a decision possible. Therefore, the use of the proportion formula was continued because of a desire to test it further.

Front dart width The proportion formula was used in the determination of the front dart width in the last pattern made for subject W. This was also the last pattern made in this study and the only one in which the proportion formula was tested on the front dart. It was not used to set the final size of the dart but was used to alter the original Vogue basic front dart to the subject's proper size before the dart was reduced to its final three-fourths inch width by pivoting the pattern to add flare.

Before altering the Vogue pattern front dart so it was right for the waistline-hipline circumference difference of the subject, it was necessary to compute the constants in the formula. The front dart of all of the Vogue patterns except two, measured one and three-eighths inches. The two darts

that deviated, did so by only one-sixteenth of an inch so this deviation was disregarded and one and three-eighths inches was used as one of the constants in the formula. The second constant, was an average of the difference between the hipline and waistline of all Vogue's front skirt patterns. This constant was two and five-eighths inches. The formula read as follows for the front dart:

Average difference between hips and waist of Vogue's front skirt pattern	:	Vogue's front dart width	::	Difference between hips and waist for subject's altered front skirt pattern	:	Front dart width for subject
---	---	-----------------------------------	----	--	---	--

2 5/8"	:	1 3/8"	::	b	:	x
--------	---	--------	----	---	---	---

or

$$x = .524 b$$

This alteration had not been used in any of the patterns for subjects A, H and L. Their waistline-hipline circumference difference was small so any need for this alteration had not been obvious. The alteration for subject W seemed satisfactory so it was incorporated in the method.

Method of adding flare The first patterns altered for subjects A and H were made in basic skirts which contained no flare. The resulting patterns were wider above the hipline than at the hipline (Fig. 9). To correct this and also because flare makes fitting problems in a skirt easier to handle, flare was introduced. In the third pattern for subject H the flare was added by drawing it on at the side seam. Drawing on the flare caused no dart size reduction (Fig. 10) and there

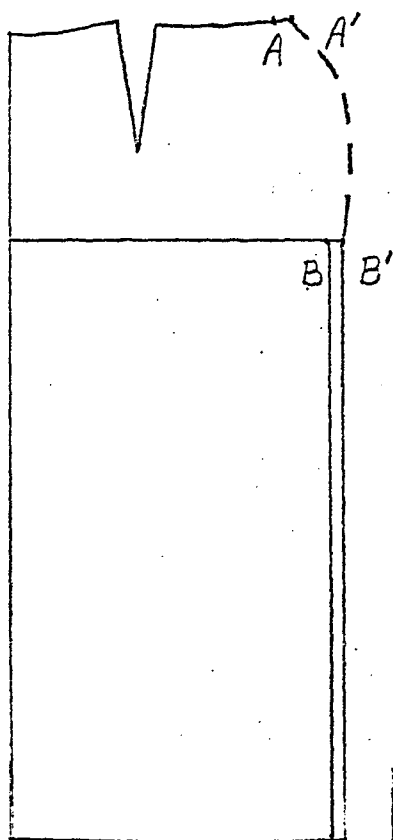


Fig. 9. No flare

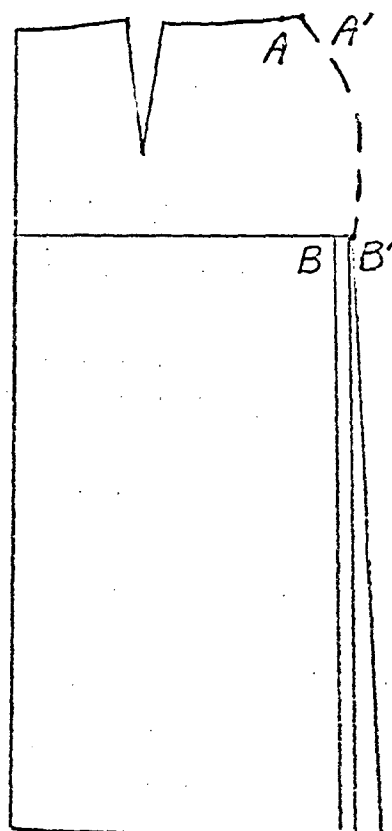


Fig. 10. Flare drawn on

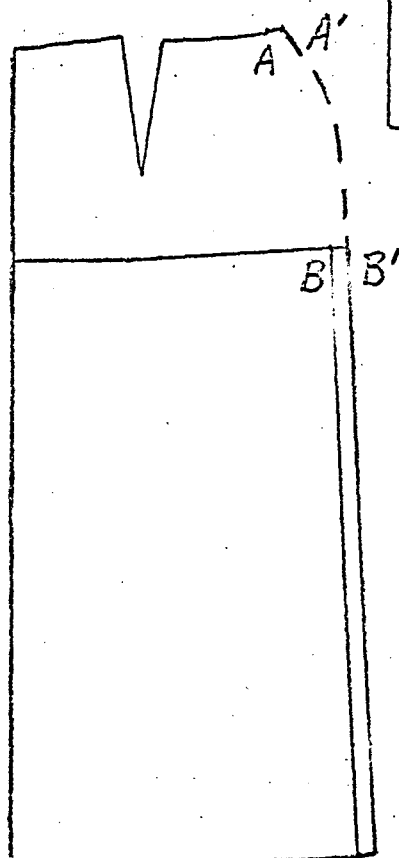


Fig. 11. Flare added by pivot method

was no change in the waistline curve. This usually occurs in the pivot method of adding flare. Pattern four for subject H had the flare put in by the pivot method and a smooth side seam resulted (Fig. 11).

Reshaping of the 'transplant' for extremes from normal curve When patterns incorporating all previous alterations were made for subject W, the 'pouched' effect reappeared in the side seams at the hipbone level. Subject W had a waistline-hipline difference of fifteen and three-fourths inches. This was five inches more than the Vogue pattern. Because of this, her silhouette 'transplant' was very rounded. It was thought that reshaping the 'transplant' by making it less curved near the waistline would remove the 'pouch'. As the curve was reshaped, the waistline length increased one-half inch. This one-half inch was transferred to the dart, thus increasing its width. This seemed logical when related to the principle that a figure with large hips and a small waist needs larger darts. The reshaping of the curve of the hip silhouette 'transplant' resulted in some improvement but not enough.

A second reshaping method was tried. This method employed the French curve,¹ an instrument used in pattern drafting to establish curved seamlines. The French curve was 'blended' in with the side seamline for about two inches at

¹The French curve is a Dietzgen number thirteen irregular curve.

approximately the three to five inch hip level or the level of greatest curve. A tracing of the French curve from this point to the waistline made the new side seam curve to the waistline. In the case of subject L, the difference between the total hips and waist circumferences was less than the Vogue pattern average. The same correction, in reverse, was used for subject L. The curve was made greater and the waist length was reduced. The amount of waistline reduction was transferred to the dart so it became smaller and the waistline was restored to its proper length (Fig. 12 and 13).

Length adjustment for front, back and side seam differences A procedure was developed for a length adjustment for center front, center back, and side seam differences based upon the establishment of a rectangle from the hipline to the hemline of the skirt patterns. The adjustment for differences in length at the four points was made between the hipline and the waistline. For example, a side seam that was shorter than the original Vogue pattern was adjusted by lowering the waistline at that side seam (Fig. 14 and 15).

Waist length differences In all but two patterns a two inch difference in length between back waist and front waist was maintained since all of the Vogue patterns studied (Appendix B) had this two inch difference. On one skirt pattern for subject H and one for subject A, a one inch difference was tested but since no major improvement in appearance

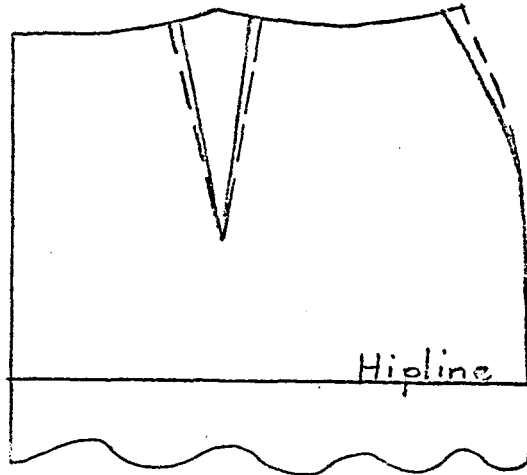


Fig. 12. Subject W - Reshaping of hip silhouette 'transplant'

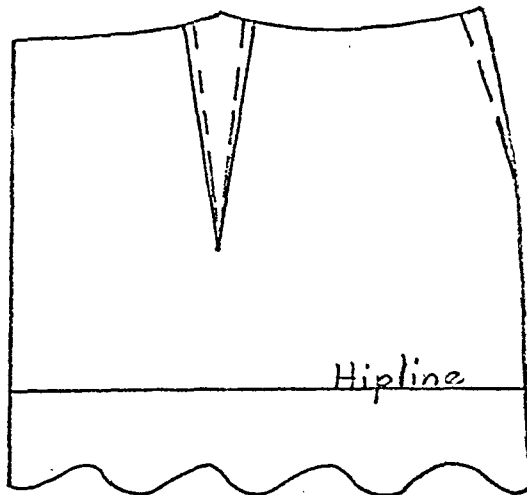


Fig. 13. Subject L - Reshaping of hip silhouette 'transplant'

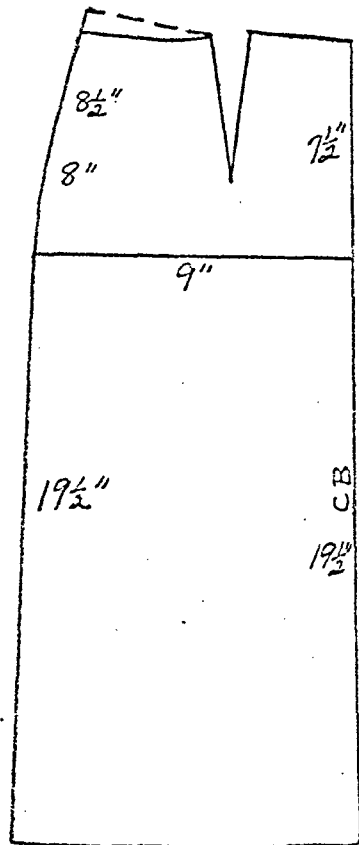


Fig. 14. Adjustment of back skirt length at center back and side seam

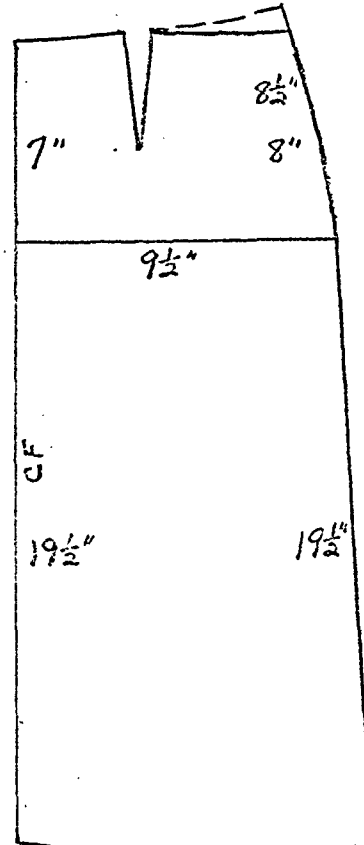


Fig. 15. Adjustment of front skirt length at center front and side seam

was noticed further tests were made with the two inch difference.

The accompanying chart summarizes the factors tested in relation to their use in the skirt patterns made for each subject. As the chart shows the first testing was done on subject A and subject H and the later testing on subject W and subject L. Although subject A is listed first and the testing was begun on her, many times the testing was done concurrently on two subjects. At times, testing was begun on one subject, interrupted and then later returned to that subject. The word 'none' on the chart indicates that the test was not made for that subject.

Chart 1. Factors tested in skirt patterns made in the development of pattern alteration method

Patterns for Subject:				A	H	W	L
HIP SILHOUETTE 'TRANSPLANT' I:							
From hipline which includes ease to waistline which includes ease							
Back dart width - Pepin method				1 ^a	N ^b		
				(paper only)			
Back dart width - Sykora method				2	1		
Back dart width - proportion formula ^c				3	2		
Flare drawn on at side				N	3		
HIP SILHOUETTE 'TRANSPLANT' II:							
From hipline which includes ease to waistline which includes no ease (Ease added after 'transplant')							
Waist length difference, 1" longer front				4	N		
Flare added by the pivot method ^c				(paper only)			
				4 ^d	4		
Waist length difference, 2" longer front ^c				5	5		
				(paper only)			

^aThe numbers indicate the sequence of patterns made for each subject.

^bN indicates that no pattern was made to test this factor for this subject.

^cIndicates a satisfactory procedure used for all patterns listed below this level of the chart.

^dBoth this factor and the above factor were tested in the same pattern.

Chart 1. (Continued)

Patterns for Subject:		A	H	W	L
HIP SILHOUETTE 'TRANSPLANT' III: ^c					
From hipline which includes no ease to waistline which includes no ease (Ease added to both after 'transplant')					
Reshaping I of silhouette for extremes from normal		N	N	2	N
Length adjustment for front, back and side seam differences ^c		N	N	N	2
Reshaping II of silhouette for extremes from normal ^c		N	N	3	3
Front dart width - proportion formula		N	N	4	N

^eNo patterns are listed for subject L and subject W previous to the use of the hip silhouette 'transplant' III because testing on them was begun only at this point of the testing program.

FINDINGS

A measurement study was made to compare the Vogue basic skirt pattern with other commercial basic patterns. Data were compiled in tables (Appendix A and B). Results of an analysis of this data were used to establish some of the test factors for the development of a method of alteration of skirt patterns based on the use of a 'transplant' of the hip silhouette on the side seam line.

The location of the side seams of a skirt is dependent on the width relationship of the front and back skirt patterns. The front of a skirt is usually wider than the back of a skirt. This difference in skirt width places the side seam at a desirable location. There was little agreement among the commercial basic patterns as to the difference in width that should exist at the waistline and the hipline. Table 2 presents the difference in width between the front and back for six commercial basic skirt patterns. For a garment, the difference would be twice this amount.

Five of the six patterns were approximately one inch wider at the front waistline. Two of the six were approximately one-half inch wider at the front hipline. There was relatively little difference in the width at these two locations for the other patterns.

The difference in front and back width which was chosen for use in this study was that of the Vogue basic pattern,

Table 2. Relationship of the width of the front patterns to the width of the back pattern

	Waistline (positive difference of front over back)	Hipline (positive difference of front over back)
Vogue 3000	1 1/8 in.	1/2 in.
Simplicity Basic	1	0
Advance 8350	1	1/8
Simplicity 4252 Proportioned M	15/16	0
McCall's Try-on B-100	13/16	3/8
Butterick 200	9/16	1/8

namely one inch at the waistline and one-half inch at the hipline.

The amount of flare in the six commercial patterns is given in Table 3. The amount of flare in the front skirt patterns ranged from one-sixteenth inch to two and three-fourths inches. Flare in the back skirt patterns ranged from three-sixteenths inch to two and five-eighths inches.

The one inch of flare in the skirt back and the (approximately) two inches used in the skirt front in this study fell within this range.

In Table 4, the relationship of the amount of flare and the width of the dart is given. Although the figures in Table 4 show no uniform increment in amount of flare or correspond-

Table 3. Amount of skirt flare as measured at the hemline

	Front skirt pattern	Back skirt pattern	Total flare in patterns
Vogue 3000	1/16 in.	3/16 in.	1/4 in.
Simplicity 4252 Proportioned M	1/8	3/16	5/16
McCall's Try-on B-100	9/16	11/16	1 1/4
Butterick 200	1 13/16	2 1/8	3 15/16
Simplicity Basic	2 9/16	2 9/16	5 1/8
Advance 8350	2 3/4	2 5/8	5 3/8

Table 4. Relationship of back dart and back flare in the pattern

	Back flare	Back dart width
Vogue 3000	3/16 in.	1 7/16 in.
Simplicity 4252 Proportioned M	3/16	1 3/4
McCall's Try-on B-100	11/16	1 7/8
Butterick 200	2 1/8	1 1/4
Simplicity Basic	2 9/16	1 5/8
Advance 8350	2 5/8	1 3/4

ing reduction in dart width, when the six patterns were placed into two groups as is the case in Table 4, there was an indication that in general an increase in flare is accompanied by a decrease in dart width. This principle was the basis for the experimentation with the two test factors, width of dart and amount of flare.

The results of a comparative study of the Vogue basic skirt pattern in Misses sizes ten to twenty showed an increment in measurement at four locations, namely: waistline, hipline, distance from center back to back dart and distance from center front to front dart. Table 5 presents this increment. The increment, however, was neither uniform nor gradual.

All the other measurements in the Vogue patterns remained relatively constant regardless of size of pattern. The

Table 5. Increment in size of Vogue patterns Misses sizes 10 to 20

Size	Total waistline	Total hipline	Distance from center back to dart	Distance from center front to dart
10-12	1 1/8 in.	5/8 in.	1/16 in.	1/16 in.
12-14	1 1/8	1 1/4	3/16	3/16
14-16	1 7/8	2	-1/16	1/16
14-18	1 7/8	2 1/8	5/16	1/16
18-20	2	1 7/8	1/16	3/16

waistline-hipline difference for all Vogue patterns sizes ten to twenty, as given in Table 6, remained relatively constant despite an increment in length at the waistline and hipline from smaller to larger sizes.

Table 6. Waistline-hipline difference in Vogue patterns

Size	Total front difference	Total back difference	Total garment difference
10	5 6/16 in.	6 6/16 in.	11 3/4 in.
12	5	6 4/16	11 1/4
14	5 6/16	6	11 3/8
16	5 4/16	6 4/16	11 1/2
18	5 6/16	6 6/16	11 3/4
20	5 6/16	6 14/16	12 1/4

The fact that the width of the front and back darts remained almost constant regardless of the skirt size was contrary to what was expected. This standard dart size can be explained by the fact that the dart width is based upon the waistline-hipline circumference difference and this difference, as the table above shows, was almost constant in the Vogue pattern. Thus the dart width could remain constant also.

Silhouette Types

Four women participated in both the present study and that of Philipsz (20). It was observed that their silhouettes changed from one type classification (Philipsz, 20, p. 14) to another when a girdle was worn. This change is given in Table 7.

Table 7. Change in hip silhouette type classification which occurred when a girdle was worn

	Sister Liguori Philipsz' study (without girdles)	Present study (with girdles)
Subject 1	flattened	flattened
Subject 2	flattened	rounded
Subject 3	pear-shaped	rounded
Subject 4	rounded	rounded

Results of Experimentation with Test Factors

The test factors explored in this study were divided into two groups, namely, minor factors which were not directly related to the hip silhouette 'transplant' and major factors which were directly involved in 'transplanting' the hip sil-

houette to the side seam of the skirt pattern. During the experimental program some factors from each group gave satisfactory performance and were retained as part of the pattern alteration method. Other test factors failed to perform satisfactorily so were dropped from the study. One test factor, when compared to similar procedures, was not sufficiently discriminating to be used.

The factor which was not sufficiently discriminating was:

1. The Sykora method¹ vs. the proportion-formula as a means for the establishment of dart width. The proportion method was chosen in order to gain more experience with it.

Factors which failed to perform satisfactorily and were dropped from the study were:

1. The Pepin method (19, p. 171) of determination of dart width. The size of the dart resulting from this method seemed to be excessive in comparison with the others.
2. The addition of flare by drawing it on at the side seam. It failed to give the small amount of extra width obtained when the pivot method was used and it did not produce either a comparable reduction in dart size or an increase in curve of the waistline seam.

¹Norma Hollen. Iowa State University, Ames, Iowa. Mme. Mary Sykora's method for the determination of the dart width. Private communication. 1962-63.

These were two factors in favor of the pivot method.

3. Hip silhouette 'transplants' I and II failed because of the formation of 'pouches' in the side seam of the skirt. The reason for the failure seemed to be excessive roundness in the curve of the side seam at the hipbone level. In these two 'transplants' that failed to give a smooth fit, some or all of the ease was added prior to the 'transplanting' process.

Factors which performed satisfactorily and which became part of the alteration method were:

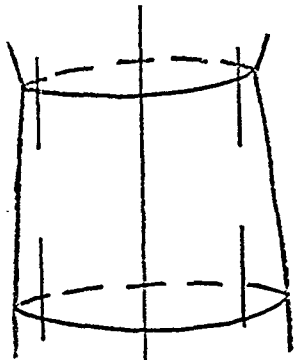
1. The proportion formula for the determination of dart width.
2. The pivot method for the addition of flare and the reduction of dart size in the skirt.
3. The length adjustment for front, back and side seam differences.
4. Hip silhouette 'transplant' III in which ease was added at both the waistline and the hipline after the 'transplant' was made. This procedure eliminated 'pouches' formed in the side seam of the skirt by reducing the curve in the side seam line of the pattern.
5. Reshaping the 'transplant' of the hip silhouette of subjects whose waistline-hipline circumference deviated widely from that of the Vogue pattern.

This reshaping gave an increase or decrease in waistline length which was transferred to the darts as increased width for those with large differences or decreased width for those with small differences.

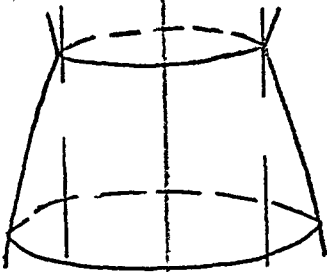
Subjects' Satisfaction with the Final Test Skirts

Three of the subjects, Subject A, Subject W and Subject L, expressed satisfaction with their skirts and asked if they might have the pattern. Subject H did not express any dissatisfaction but also, did not express any desire to have her pattern. The following explanation may account for this: The testing of skirts for subject H was completed before the procedure for reshaping the hip silhouette 'transplant' was introduced. This reshaping procedure would have resulted in an increase in dart width for subject H since her waistline-hipline circumference difference deviated two inches from that of the Vogue pattern. This deviation was not considered in the tests for subject H and the method of skirt pattern alteration as it was developed for the normal figure was used for her patterns. Her dart width was determined by the proportion formula only. There was not time in this study to make a test of the effect of reshaping the 'transplant' in her pattern.

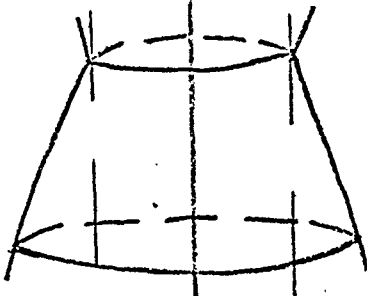
Fig. 16 gives a diagrammatic presentation of the waistline-hipline circumference difference of the four subjects



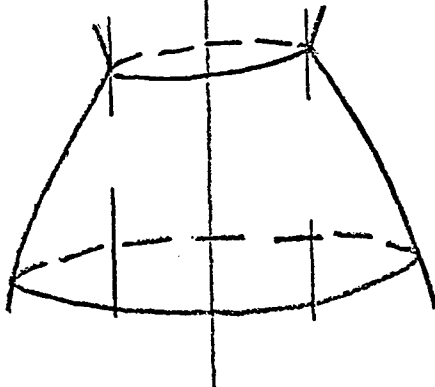
Subject L
Deviation from Vogue,
minus $\frac{3}{4}$ inches.
'Transplant' reshaped..



Subject A
Within range, $9 \frac{7}{8}$ inches.
'Transplant' reshaping not needed.
Vogue pattern, Waistline-hipline
difference range, 9-10 inches.



Subject H
Deviation from Vogue,
plus 2 inches.
'Transplant' NOT reshaped.



Subject W
Deviation from Vogue,
plus $5 \frac{3}{4}$ inches.
'Transplant' reshaped.

Fig. 16. Diagrammatic representation of the difference for waistline-hipline circumference of the four subjects and of the Vogue basic pattern

and of the Vogue pattern. The discussion given in the paragraph is clearly illustrated by these drawings.

Reshaping of the hip silhouette 'transplant' for subjects with deviation from the normal waistline-hipline circumference difference of the Vogue pattern is one of the aspects of the alteration method that should be investigated further.

Hip Silhouette Method of Pattern Alteration

A method of skirt pattern alteration using the hip silhouette was successfully developed. Directions, intended for use by students in a college flat pattern course, were prepared. These directions incorporated the procedures and techniques that gave satisfactory performance during the testing program.

Also included with the method were:

Directions for taking measurements.
(These differed somewhat from those usually employed.)

A Personal Measurement Record Chart

Directions for reshaping the 'transplant' of the hip silhouette of persons whose waistline-hipline circumference deviates from that of the Vogue basic pattern.

A Personal Measurement Reference Table for reducing the number of calculations required in the completion of the Personal Measurement Record and for reducing the possibility of error that might occur when these calculations are made.

This entire Pattern Alteration Unit is presented in the pages that follow.

HIP SILHOUETTE METHOD
FOR SKIRT PATTERN ALTERATION

Individuals differ not only in their size, but also in their shape. This method for skirt pattern alteration is designed to take into account both of these differences by means of a hip silhouette drawing of the person.

The directions on the following pages include:

- | | |
|---|--------------|
| 1. Personal Measurement Record | p. <u>49</u> |
| 2. How to Take Measurements | p. <u>50</u> |
| 3. Personal Measurement Reference Table | p. <u>53</u> |
| 4. How to Prepare the Hip Silhouette | p. <u>54</u> |
| 5. Hip Silhouette Alteration Method | p. <u>56</u> |
| 6. Reshaping of Hip Silhouette 'Transplant' | p. <u>60</u> |

The Measurement Reference Table is for convenience to reduce the possibility of error which occurs often in student computations and to reduce the amount of time needed for the preliminary steps.

PERSONAL MEASUREMENT RECORD

A. Lengthwise measurements:

1. Waist-to-hips CB_____
2. Waist-to-floor CB_____ RS_____ CF_____ LS_____
3. Hem-to-floor CB_____
4. Waist-to-hem CB_____ RS_____ CF_____ LS_____

(Item 2 minus item 3)
5. Hips-to-hem CB_____

(Item 4CB minus item 1)
6. Waist-to-hips RS_____ CF_____ LS_____

(Item 4 minus item 5)
7. Waist to tip of back dart _____ (Item 1 minus 1 1/2")

B. Circumference measurements:

8. Hips _____(no ease) + 2" ease = _____total
9. Front hip of pattern*_____; back hip of pattern*_____
10. Waist _____(no ease) + 1 1/2" ease = _____total
11. Front waist of pattern**_____;

back waist of pattern**_____.
12. Difference (no ease) total hips (item 8)

and total waist (item 10) _____
13. Variation from pattern average difference (9 5/8")

C. 14. Width of dart***_____

*See Measurement Reference Table, Part A on page 53.

**See Measurement Reference Table, Part B on page 53.

***See Measurement Reference Table, Part C on page 53.

HOW TO TAKE MEASUREMENTS

These measurements should be taken over a slip and girdle with the dress removed. It is advisable to check the measurements by taking a second set. Because it is difficult to measure one's self accurately, ask some capable person to do it. Fill in all of the measurements on the Personal Measurement Record which accompanies these directions. The numbers in parentheses, which occur in the directions below, refer to corresponding items on the Personal Measurement Record.

1. Tie a pliable tape measure at the waistline. Make sure it is in the correct position and tied snugly (not tight). Several measurements are dependent upon the accurate position of this tape measure.
2. To establish the hipline:
 - a. View the figure from the side. Find the place where the outward curve ceases and the inward curve begins (Fig. 18).
 - b. Place a pin horizontally in the slip at this place at center back. This pin marks the hipline position.
3. Measure the hipline length (1) from the lower edge of the tape to the pin.
4. Measure the waist-to-floor length (2) by using a tape measure that is attached to one side of a yardstick (Fig. 17). Place the yardstick so the tape measure is against the body. Bring the free end of the tape up along the hip to the lower edge of the waistline tape. Keep the yardstick perpendicular to the floor. Take measurements at center front, center back, right side, and left side.
5. To measure the hipline circumference (8):
 - a. Place additional pins at intervals around the figure at the hipline. Place all pins the same distance below the waistline.
 - b. Place a tape measure so the lower edge rests on the row of pins and take a snug measurement.

- c. Now spread the tape two inches more. Insert your hands under the tape and hold it out in line with the abdomen. (Figs. 19 and 20) If two inches does not seem to be enough to permit the tape to line up with the abdomen, let it out a little more. Two inches is the usual amount of ease (8). For a tighter fitting skirt one and one-half inches may be sufficient.
- 6. To measure the waistline circumference (10):
 - a. Remove the tape which marked the waistline position.
 - b. Place the second tape measure around the waistline so it is snug.
- 7. Before measuring the hem-to-floor length, remove the pins at the hipline and put dress on. Use the dress hemline as a guide and measure the hem-to-floor length (3) with a yardstick.

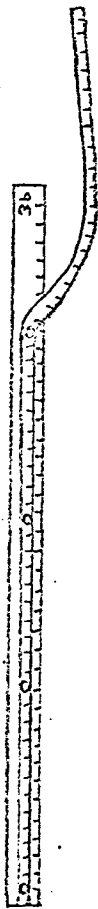


Fig. 17. Extended yardstick

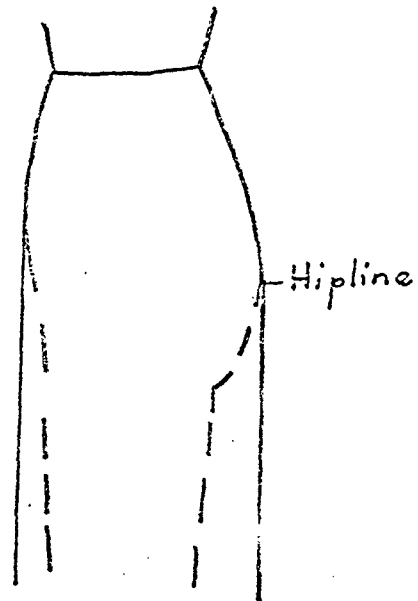


Fig. 18. Location of hipline.

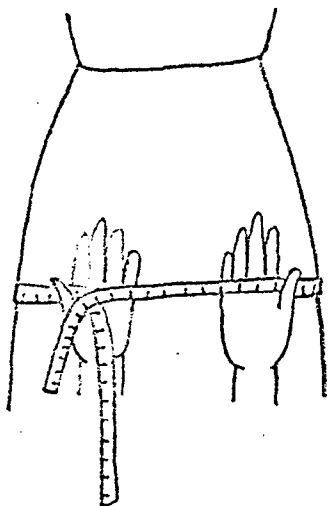


Fig. 19. Allowance for ease

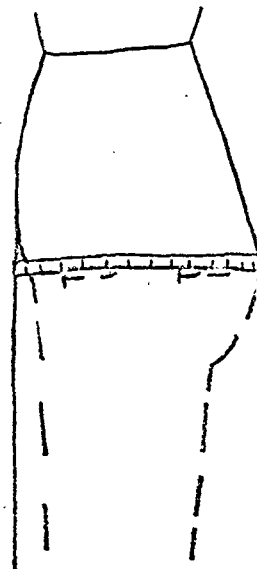


Fig. 20. Allowance for ease

Table 8. Personal measurement reference table

A Length of hipline ^a				B Length of waistline ^b				C Dart width	
Person's For front		For back		Person's For front		For back		Total difference	
actual	skirt	pattern		actual	skirt	pattern		hip and waist	Dart
hips	pattern	skirt		waist	pattern	skirt		(ease added)	width
(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)	(in.)
32	8 1/4	7 3/4	22	6 1/8	5 1/8	5 1/8	7 1/2	15/16	1
32 1/2	8 3/8	7 7/8	22 1/2	6 1/4	5 1/4	5 1/4	8 1/2	1 1/16	1
33	8 1/2	8	23	6 3/8	5 3/8	5 3/8	9	1 1/8	1
33 1/2	8 5/8	8 1/8	23 1/2	6 1/2	5 1/2	5 1/2	9 1/2	1 3/16	1
34	8 3/4	8 1/4	24	6 5/8	5 5/8	5 5/8	10	1 1/4	1
34 1/2	8 7/8	8 3/8	24 1/2	6 3/4	5 3/4	5 3/4	10 1/2	1 5/16	1
35	9	8 1/2	25	6 7/8	5 7/8	5 7/8	11	1 3/8	1
35 1/2	9 1/8	8 5/8	25 1/2	7	6	6	11 1/2	1 7/16	1
36	9 1/4	8 3/4	26	7 1/8	6 1/8	6 1/8	12	1 1/2	1
36 1/2	9 3/8	8 7/8	26 1/2	7 1/4	6 1/4	6 1/4	12 1/2	1 9/16	1
37	9 1/2	9	27	7 3/8	6 3/8	6 3/8	13	1 5/8	1
37 1/2	9 5/8	9 1/8	27 1/2	7 1/2	6 1/2	6 1/2	13 1/2	1 11/16	1
38	9 3/4	9 1/4	28	7 5/8	6 5/8	6 5/8	14	1 3/4	1
38 1/2	9 7/8	9 3/8	28 1/2	7 3/4	6 3/4	6 3/4	14 1/2	1 13/16	1
39	10	9 1/2	29	7 7/8	6 7/8	6 7/8	15	1 7/8	1
39 1/2	10 1/8	9 5/8	29 1/2	8	7 1/8	7 1/8	15 1/2	1 15/16	1
40	10 1/4	9 3/4	30	8 1/8	7 1/8	7 1/8	16		
40 1/2	10 3/8	9 7/8	30 1/2	8 1/4	7 1/4	7 1/4			
41	10 1/2	10	31	8 3/8	7 3/8	7 3/8			
41 1/2	10 5/8	10 1/8	31 1/2	8 1/2	7 1/2	7 1/2			
42	10 3/4	10 1/4	32	8 5/8	7 5/8	7 5/8			
42 1/2	10 7/8	10 3/8	32 1/2	8 3/4	7 3/4	7 3/4			
43	11	10 1/2	33	8 7/8	7 7/8	7 7/8			
43 1/2	11 1/8	10 5/8	33 1/2	9	8	8			
44	11 1/4	10 3/4	34	9 1/8	8 1/8	8 1/8			
44 1/2	11 3/8	10 7/8	34 1/2	9 1/8	8 1/8	8 1/8			

^aSkirt front hipline is 1 inch larger.^bSkirt front waistline is 2 inches larger.

HOW TO PREPARE THE HIP SILHOUETTE

The silhouette is made over the slip and girdle with the dress removed. (Do this at the same time that the measurements are taken.) The directions are as follows:

1. Tape a soft lead pencil to the short arm of a fabric square. Only a small amount of the pencil should extend beyond the corner. See Fig. 21.
2. Fasten a piece of paper to the wall. This paper should be wider than the body and extend from waist to knees. Check the location of the paper by standing in front of it.
3. Stand in a natural position with the back against the paper.
4. Place the fabric square at the waistline with the edge of the long arm of the square touching the wall. Keep square parallel to floor.
5. Make a short definite crosswise mark at the waistline (Fig. 22). Then start slightly above the waist and move the fabric square down along the hips until the widest area of the hips has been traced. Try not to press the edge of the square into the flesh as the drawing is made.
6. Repeat on the other side. Stand very still until the second silhouette is drawn. To check for accuracy make another silhouette and compare with the first.
7. Make a tagboard copy as follows:
 - a. Choose the best side and 'perfect' the line smoothing out any irregularities.
 - b. Trace the 'perfected' silhouette on tagboard and cut off excess paper. See Fig. 23.
 - c. Refer to the Personal Measurement Record for side-hip length (6) and mark in red on the tagboard. (If the sides differ 1/2 inch or more mark the left side hip length in blue.)

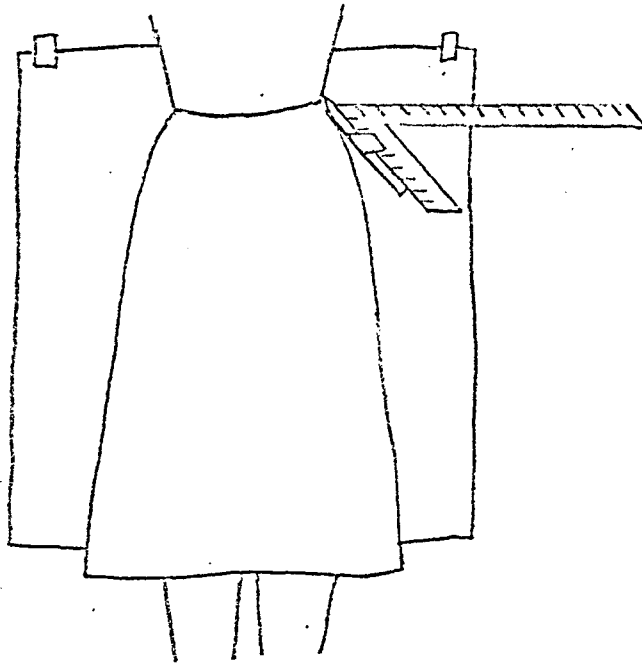


Fig. 21. Position of fabric square

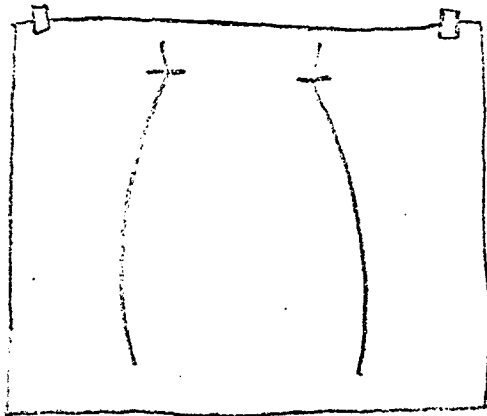


Fig. 22. Completed silhouette drawing

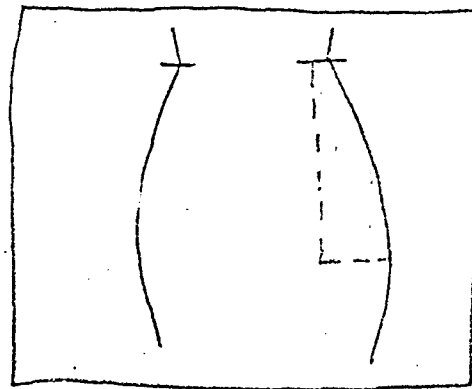


Fig. 23. Area for tagboard copy

HIP SILHOUETTE ALTERATION METHOD
(for basic skirts)

Take measurements and fill out the Personal Measurement Record. Numbers in parentheses in the following directions refer to items in this Record. Prepare a tagboard copy of the hip silhouette for use in step 7. Directions p. 54. Select the Vogue basic pattern of the nearest (preferably larger) size and alter as directed below. Use a red pencil so pattern alteration lines will be distinguishable from original pattern lines. The illustrations used here show only the alteration lines at the side seams.

This method must be varied if the hip-waist circumference difference of the figure is greater or smaller than the average difference of 9-10 inches. Directions for variation are given on p. 60. Directions:

Start with the back

1. "Square a line"¹ from the center back at the hipline, B in Fig. 24 (1, 6CF) and at the hemline, C in Fig. 24 (4).
2. Check and correct dart width (14).
3. Check and correct dart length:
 - a. Back dart length is 1 1/2 inches above the hipline.
 - b. Front dart length is 3 1/2 inches.
4. Mark off correct widths at points A, B and C in Fig. 24. (Measurements without ease are used):
 - a. Waist point A (11) (do not include dart in this measurement)
 - b. Hip point B (9)
 - c. Hem point C (use same measurement as for B)
5. Draw a line from hip to hem to form a rectangle as shown in Fig. 24.

¹The term "square a line" means to draw a line at right angles to another line.

6. Add flare and reduce size of corrected dart as follows:
 - a. Draw broken line parallel to center of the pattern, through the center of the dart and down to the hem as in Fig. 24.
 - b. Make a dot halfway between tip of dart and hipline. See Fig. 24.
 - c. Slash the pattern down to, but not through, the dot.
 - d. Slash up to, but not through, the dot as in Fig. 24.
 - e. Pin center area of pattern securely to a large piece of paper. See Fig. 25.

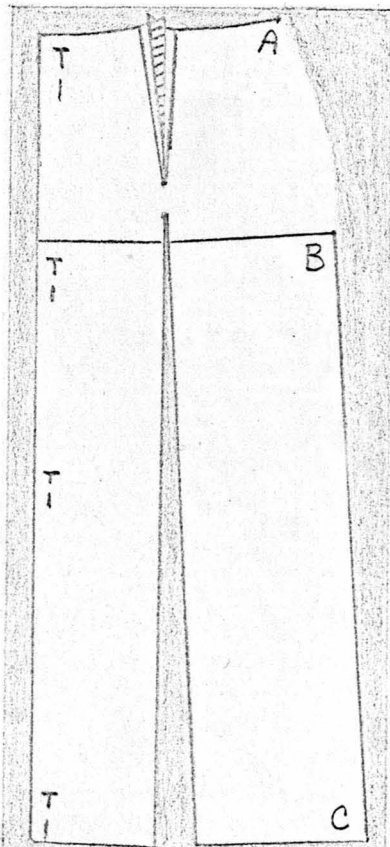


Fig. 25. Addition of flare

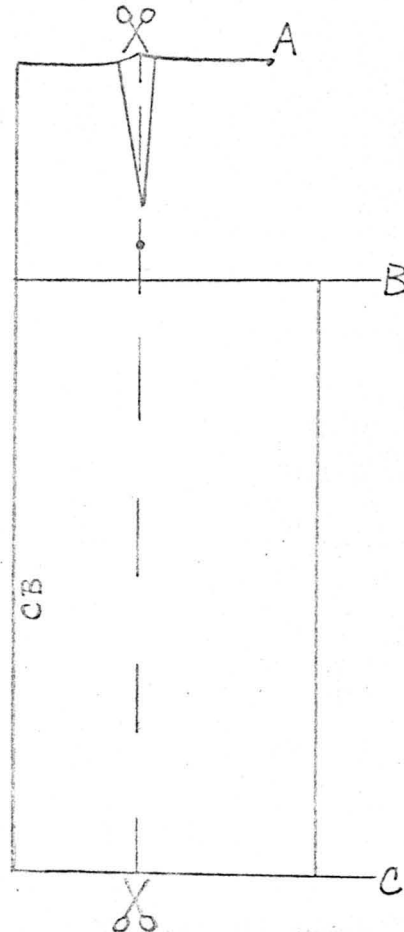


Fig. 24. Basic skirt

- f. For skirt back: Spread pattern at hemline slash until the space measures 1". The size of the dart is automatically reduced as shown in Fig. 25.
- g. For skirt front: Spread pattern until dart closes to $\frac{3}{4}$ ". The amount of flare is automatically greater than the amount of flare in the back.

h. The hipline and the hemline will now have an upward slant. See Fig. 25.

7. 'Transplant' the hip silhouette as follows (broken line, Fig. 26):

- a. Join the tagboard hip silhouette to the hipline, point B.
- b. Then join it to the waistline, point A. Raise or lower the waistline if necessary to permit hip curve and waistline to meet at A. If the difference between the right and left waist-to-hips measurements (6) is $1/2$ " or more, two waist points will need to be marked. Use a blue pencil for the left side waistline.
- c. Add waistline ease. Measure out $3/8$ " and mark point A' (total ease is $1\ 1/2$ "). Add hipline ease. Measure out one-half inch and mark point B' (total ease is 2") (2). See Fig. 27. Widen the pattern the same amount down to the hemline.
- d. Complete the side seam line as follows:
Draw a line from the waistline ease A' to D, the place where it blends with dotted line of hipline curve. This can often be a ruler straight line. The same procedure is followed in blending the hipline ease B' with the hipline curve. This is shown in Fig. 27.

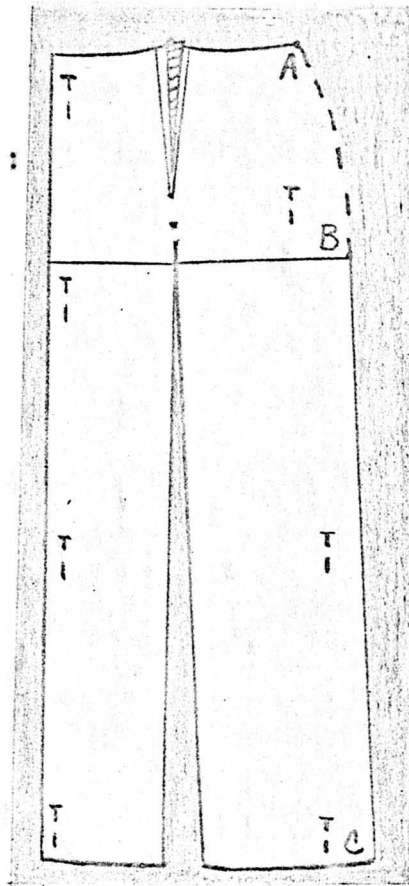


Fig. 26. 'Transplant' silhouette

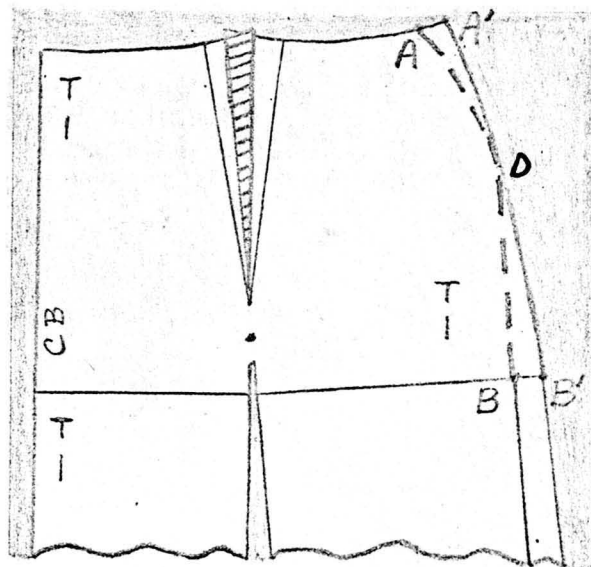


Fig. 27. Addition of ease

8. Complete the new dart line, fold dart and perfect the waistline curve and perfect the hemline curve.
9. Correct seam allowances in the altered areas as necessary.

Follow these directions for the skirt front, making the changes indicated.

RESHAPING OF HIP SILHOUETTE 'TRANSPLANT'
 For hip-waist circumference difference
 variance from the average

The hip-waist difference in circumference for the Vogue pattern is 9-10 inches. If the hip-waist difference is outside this normal difference range, correct for this as follows:

1. 'Transplant' the hip silhouette as usual, Item 7 in the alteration method. Place the French curve as shown in Fig. 28 or 29 to coincide with line A'B' between the three to five inch level. The upper end of the French curve will fall outside the hip 'transplant' if the silhouette is quite rounded. It will fall inside the 'transplant' if the silhouette curve is flattened. Trace along the French curve for the new corrected side seam line, A''B'.
2. Increase or decrease the size of the dart by the amount of increase or decrease that occurs in the waistline. Make the dart larger or smaller by adding or subtracting at both sides of the dart.

Generalizations: A very straight hip requires a small amount of dart.

A very curved hip requires a large amount of dart.

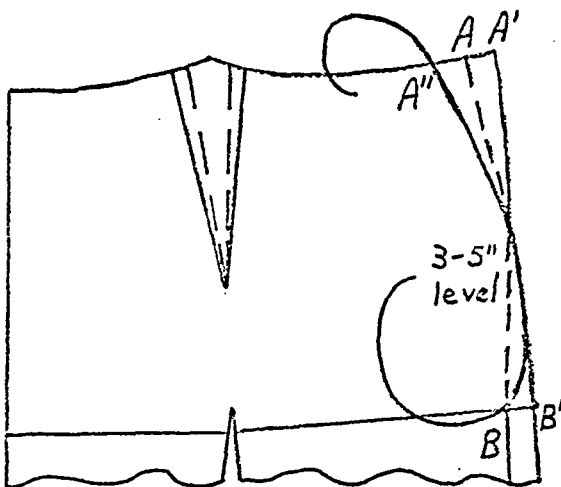


Fig. 28. Hipline with little curve

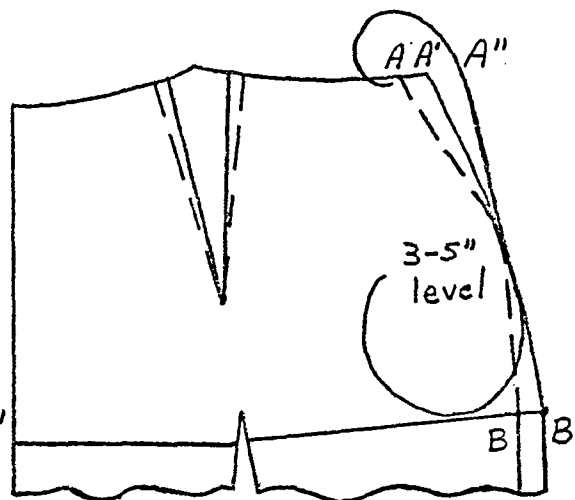


Fig. 29. Hipline with much curve

SUMMARY

The major purpose of this research was to explore the feasibility of the development of a pattern alteration method based upon the use of a hip silhouette 'transplant' at the side seam of the skirt pattern.

A comparative measurement study of available commercial basic patterns and of Vogue basic patterns in Misses sizes ten to twenty was made. The findings were arranged in tables which were used as a source of reference material. Some relationships which were observed in the measurement data were useful in the determination of some test factors. The relationships which were observed and used were as follows:

1. The skirt front pattern width was one inch greater at the waistline and one-half inch greater at the hip-line than the skirt back pattern width.
2. As the amount of flare in the skirt increased, the width of the dart decreased.
3. Measurements at four locations on the Vogue basic pattern, namely, waistline, hipline, distance from center front to front dart, and distance from center back to back dart, all increased in measurement from one pattern size to the next but the increment was not uniform in rate or amount. All other measurements remained relatively constant regardless of pattern size.

4. The difference between waistline-hipline circumference measurements and its relationship to dart width remained relatively constant regardless of increases in pattern size.

The Vogue basic pattern was selected for use in the experimental work of this study because it was available locally and it was the pattern used by the flat pattern classes of Iowa State University.

Thirteen women from Iowa State University were measured and their hip silhouettes were drawn by an outside caliper while a girdle was worn. The caliper was developed by the Instrument Shop at Iowa State University. An improvised caliper consisting of a fabric square with a pencil attached at the corner also was used to make hip silhouettes. The silhouettes made by the two instruments compared favorably.

Four of the thirteen women who were measured in this study had participated in a previous study of hip silhouettes by Sister Liguori Philipsz (20). Their hip silhouettes, taken without girdles, had been classified into three types: flattened, rounded, and pear-shaped. It was observed in the present study that when girdles were worn some of the subjects changed from one type classification to another.

Two groups of test factors, a minor group which was not directly concerned with the 'transplant' and a major group

which was directly involved in the 'transplant', were evaluated. Poor fit in a test skirt was evidenced by the appearance of 'pouches' at the hipbone level on the side seamline of the skirt. Hip 'transplant' III was used successfully in achieving a well fitting skirt for the subject whose waistline-hipline circumference difference was similar to that of the Vogue basic pattern. This difference deviated rather widely for two subjects and it was necessary to reshape the 'transplant' by the use of a French curve. This reshaping resulted in an increase in waistline length for the subject whose hipline-waistline circumference difference was large and a decrease in waistline length for the subject whose waistline-hipline circumference difference was small. The waistline of the pattern was restored to proper size by transferring the amount of waistline increase or decrease to the dart, thus increasing or decreasing its size. This was consistent with the principle that an individual whose hip measurement is large requires large darts and one whose hip measurement is small requires small darts.

Other factors which played a useful part in achieving successful fit were:

1. The proportion formula which was used to determine the width of the back and front darts.
2. Adjustment of side seam, center front, and center back lengths.

3. Addition of flare by the pivot method:

- a. One inch of flare to the back.
- b. Reduction of the front dart to three-fourths inch with an automatic increase in the amount of flare (usually about two inches).

Satisfaction with the final test skirt was expressed by three of the subjects. Failure to reshape the 'transplant' to correct for deviation from the Vogue pattern of the waistline-hipline circumference difference was a possible reason for the less satisfactory fit of the fourth final test skirt. No testing was done to confirm this because there was insufficient time to make such a test. This is one aspect of the study that merits future investigation.

The end product of this research was a Hip Silhouette Pattern Alteration Method with illustrated directions geared to the students in a college flat pattern class and with accompanying directions for the taking of measurements, the making of the hip silhouette, the reshaping of the 'transplant' for figures which deviated from normal and a Personal Measurement Record chart as well as a Personal Measurement Reference Table for the convenience of the students.

Results of this research might indicate that there should be an optimum amount of curve in a side seam and that for silhouettes with a very flattened or a very rounded shape, satisfactory fit is best achieved by a decrease or increase in dart size beyond that predicted by the proportion formula.

RECOMMENDATIONS

The following recommendations can be made on the basis of the results of this exploratory study:

1. A study of the pattern alteration method with a larger number of subjects.
2. A study of the pattern alteration method with subjects having a range of waistline-hipline circumference differences.
3. A study of the variation of the method using the reshaped curve for subjects with less or greater differences between the waistline and hipline circumferences with a larger number of subjects.
4. A study of the position of the back flare keeping the front flare as in the basic skirt pattern.
5. A study of the pattern alteration method using both the right and left hip silhouettes.

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APPENDIX A

Table 9. Measurements of commercial patterns - basic skirt, Misses size 12

	Simplicity 4252 Proportioned M	Simplicity Basic	Advance 8350	Butterick 200	McCall's Try-On B-100	Vogue 3000
Front waistline	7 1/16	7	6 13/16	6 5/8	6 3/4	7
Back waistline	6 1/8	6	5 13/16	6 1/16	5 15/16	5 7/8
Front hipline ^a	9 1/8	9 3/16	9 1/4	9 3/16	9 9/16	9 1/2
Back hipline ^a	9 1/8	9 3/16	9 1/8	9 1/16	9 3/16	9
Front dart width ^b	1 1/4	1/2	13/16	7/8	1 3/8	1 3/8
Back dart width ^b	1 3/4	1 5/8	1 3/4	1 1/4	1 7/8	1 7/16
Front dart length ^c	3 5/8	3	3 5/16	5 5/8	3 3/8	4 3/4
Back dart length ^c	5 5/8	5 9/16	6 5/16	5 15/16	5 1/8	5 1/2
Length above hipline at CF	7	7	7	7	7	7
Length above hipline at CB	7	7	7	7	7	7

^aThe hipline was measured 7" below the waistline.

^bIn some patterns this dart amount was divided into two darts, which were not always of equal size.

^cThe dart length was measured along the stitching line.

Table 9. (Continued)

	Simplicity Proportioned M	4252	Simplicity Basic	Advance 8350	Butterick 200	McCall's Try-On B-100	Vogue 3000
Length above hipline at F side seam ^d	7 5/16		7 13/16	7 7/8	7 5/8	7 3/4	7 1/2
Length above hipline at B side seam ^d	7 9/16		7 7/8	7 1/2	7 5/16	7 5/8	7 1/2
Height of waist- line curve at front side seam	1/4		11/16	3/4	3/8	3/4	5/16
Height of waist- line curve at back side seam	1/2		3/8	1/4	5/8	3/8	5/16
Flare at hemline of skirt front	1/8		2 9/16	2 3/4	1 13/16	9/16	1/16
Flare at hemline of skirt back	3/16		2 9/16	2 5/8	2 1/8	11/16	3/16
Total flare (as determined from the above measurements)	5/16		5 1/8	5 3/8	3 15/16	1 1/4	1/2

^dThis measurement was measured from the hipline 'squared' with CF or CB 7 inches below waistline.

APPENDIX B

Table 10. Measurements of Vogue Basic Pattern 3000 - skirt, Misses sizes

	10	12	14	16	18	20
Front waistline	6 11/16	7	7 3/16	7 3/4	8 3/16	8 11/16
Back waistline	5 5/8	5 7/8	6 1/4	6 5/8	7 1/8	7 5/8
Total waistline	24 5/8	25 3/4	26 7/8	28 3/4	30 5/8	32 5/8
Waistline as given ^a	24	25	26	28	30	32
Waistline ease (as determined from above measurements)	5/8	3/4	7/8	3/4	5/8	5/8
Front hipline ^b	9 3/8	9 1/2	9 7/8	10 3/8	10 7/8	11 3/8
Back hipline ^b	8 13/16	9	9 1/4	9 3/16	10 5/16	10 3/4
Total hipline	36 3/8	37	38 1/4	40 1/4	42 3/8	44 1/4
Hipline as given ^a	33	34	36	38	40	42
Hipline ease (as determined from above measurements)	3 3/8	3	2 1/4	2 1/4	2 3/8	2 1/4

^aThese measurements are taken from the chart enclosed in the Vogue pattern.

^bThe hipline was measured 7" below the waistline, disregarding the hipline marked on the pattern.

Table 10. (Continued)

	10	12	14	16	18	20
Front dart width	1 3/8	1 3/8	1 3/8	1 5/16	1 3/8	1 5/16
Front dart length ^c	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4	4 3/4
Back dart width	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16	1 7/16
Back dart length ^c	5 1/2	5 1/2	5 1/2	5 7/16	5 1/2	5 1/2
Length above hipline at CF ^d	6 15/16	6 15/16	6 15/16	6 7/8	7	6 15/16
Length above hipline at CB ^d	7 1/8	7 1/8	7 1/8	7 1/8	7 1/8	7 1/8
Length above hipline at F side seam ^e	7 7/16	7 1/2	7 1/2	7 7/16	7 7/16	7 1/2
Length above hipline at B side seam ^e	7 9/16	7 1/2	7 9/16	7 3/4	7 5/8	7 3/4

^cThe dart length was measured along the stitching line.

^dThis measurement was measured from the hipline marked on the pattern.

^eThis measurement was measured from the hipline squared with CF or CB 7 inches below waistline, rather than the hipline marked on the pattern.

Table 10. (Continued)

	10	12	14	16	18	20
Height of waistline curve at back side seam	5/16	3/8	1/2	7/16	1/2	3/8
Height of waistline curve at front side seam	5/16	3/8	3/8	5/16	5/16	5/16
Distance from CB to dart	2 11/16	2 3/4	2 15/16	2 7/8	3 3/16	3 1/4
Distance from CF to dart	3 1/8	3 3/16	3 3/8	3 7/16	3 1/2	3 11/16
Flare at hemline of skirt front	1/8	1/16	1/16	0	0	1/8
Flare at hemline of skirt back	3/16	3/16	1/4	3/16	5/16	1/4
Total flare (as determined from above measurements)	5/8	1/2	5/8	3/8	5/8	3/4

APPENDIX C

DATA CHART

Name:

Method of contact:

When available:

I. Measurements:

A. Circumference:

1. Waist: _____ (2 1/2" ease)

2. Hips: _____
(no ease) (1 1/2" ease) (2" ease)

B. Length:

1. Waist to hips _____ (at CB)

2. Waist to floor _____
CF RS LS CB

3. Floor to hem _____

4. Skirt length (2-3) _____
CF RS LS CB

II. Fit of Basic Skirt

A. Size _____

B. Problems:

C. Suggested alterations: